

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

**UNITED STATES PATENT AND TRADEMARK OFFICE**

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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

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Ex parte AHMAD GHAEMMAGHAMI,  
ZORAN KRIVOKAPIC and BRIAN SWANSON

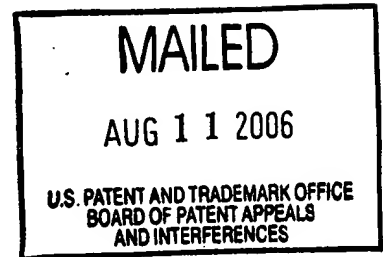
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Appeal No. 2006-1696  
Application No. 09/497,320

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ON BRIEF

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Before THOMAS, JERRY SMITH and BLANKENSHIP, Administrative Patent Judges.

JERRY SMITH, Administrative Patent Judge.

**DECISION ON APPEAL**

This is a decision on the appeal under 35 U.S.C. § 134 from the examiner's rejection of claims 1, 4, 5, 7, 8, 11, 12, 14 and 18-20.

The disclosed invention pertains to a method and system for providing a halo implant to a semiconductor device with minimal impact to the junction capacitance.

Representative claims 1 and 18 are reproduced as follows:

1. A method for providing a halo implant to a semiconductor device comprising the steps of:

- (a) providing a thin photoresist layer to the semiconductor device that covers a substantial amount of an active area comprising a source region and a drain region of the semiconductor device; and
- (b) providing the halo implant to the semiconductor device, wherein the thin photoresist layer is used as a mask.

18. A semiconductor device, comprising:

- a gate;
- an oxide trench;
- a drain region adjacent to said oxide trench;
- a source region adjacent to said oxide trench; and
- a photoresist layer of a thickness between .1  $\mu\text{m}$  to .2  $\mu\text{m}$  over said oxide trench and a substantial portion of said source and said drain region, wherein a halo implant is implanted using said photoresist layer and said gate as a mask.

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The examiner relies on the following references:

Hori et al. (Hori)	5,320,974	Jun. 14, 1994
Thompson et al. (Thompson)	6,020,244	Feb. 1, 2000 (filed Dec. 30, 1996)
Thackeray et al. (Thackeray)	6,037,107	Mar. 14, 2000 (filed Aug. 28, 1997)
Liang et al. (Liang)	6,051,458	Apr. 18, 2000 (filed May 4, 1998)

Wolf et al., (Wolf), "Silicon Processing for the VLSI Era, Volume 1: Process Technology," Lattice Press, 1986, pp. 321-324.

The following references are introduced as secondary evidence by the examiner to support the rejection of claim 18 [answer, page 13]:

Rovedo et al. (Rovedo) [not prior art]	6,352,903	Mar. 5, 2002 (filed Jun. 28, 2000)
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Kang et al., (Kang), "CMOS Digital Intergrated Circuits: Analysis and Design," 2<sup>nd</sup> ed., McGraw-Hill, 1999, figure 2.6, page 31.

The following rejections are on appeal before us:

1. Claims 1, 4, 5, 8, 11 and 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the teachings of Hori in view of Wolf [answer, page 4].
2. Claims 7 and 14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the teachings of Hori in view of Wolf, and further in view of Thackeray [answer, page 6].

3. Claim 18 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over the teachings of Liang in view of Wolf [answer, page 6].
4. Claim 19 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over the teachings of Liang in view of Wolf, and further in view of Thompson [answer, page 8].
5. Claim 20 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over the teachings of Liang in view of Wolf, and further in view of Thackeray [answer, page 8].

Rather than repeat the arguments of appellants or the examiner, we make reference to the briefs and the answer for the respective details thereof.

### **OPINION**

We have carefully considered the subject matter on appeal, the rejections advanced by the examiner and the evidence of obviousness relied upon by the examiner as support for the rejections. We have, likewise, reviewed and taken into consideration, in reaching our decision, the

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appellants' arguments set forth in the briefs along with the examiner's rationale in support of the rejections and arguments in rebuttal set forth in the examiner's answer.

It is our view, after consideration of the record before us, that the evidence relied upon by the examiner does support the examiner's rejection of claims 1, 4, 5, 7, 8, 11, 12, 14 and 18-20. Accordingly, we affirm.

In rejecting claims under 35 U.S.C. § 103, it is incumbent upon the examiner to establish a factual basis to support the legal conclusion of obviousness. See In re Fine, 837 F.2d 1071, 1073, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). In so doing, the examiner is expected to make the factual determinations set forth in Graham v. John Deere Co., 383 U.S. 1, 17, 148 USPQ 459, 467 (1966). The examiner must articulate reasons for the examiner's decision. In re Lee, 277 F.3d 1338, 1342, 61 USPQ2d 1430, 1434 (Fed. Cir. 2002). In particular, the examiner must show that there is a teaching, motivation, or suggestion of a motivation to combine references relied on as evidence of obviousness. Id. at 1343. The examiner cannot simply reach conclusions based on the examiner's own understanding or experience - or on his or her assessment of what would be basic knowledge or common sense. Rather, the examiner must point to some concrete evidence in the record in support of these findings." In re Zurko, 258 F.3d

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1379, 1386, 59 USPQ2d 1693, 1697 (Fed. Cir. 2001). Thus the examiner must not only assure that the requisite findings are made, based on evidence of record, but must also explain the reasoning by which the findings are deemed to support the examiner's conclusion. However, a suggestion, teaching, or motivation to combine the relevant prior art teachings does not have to be found explicitly in the prior art, as the teaching, motivation, or suggestion may be implicit from the prior art as a whole, rather than expressly stated in the references. The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art. In re Kahn, 441 F.3d 977, 987, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006) citing In re Kotzab, 217 F.3d 1365, 1370, 55 USPQ2d 1313 (Fed. Cir. 2000). See also In re Thrift, 298 F. 3d 1357, 1363, 63 USPQ2d 2002, 2008 (Fed. Cir. 2002). These showings by the examiner are an essential part of complying with the burden of presenting a prima facie case of obviousness. Note In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). If that burden is met, the burden then shifts to the applicant to overcome the prima facie case with argument and/or evidence. Obviousness is then determined on the basis of the evidence as a whole and the relative persuasiveness of

the arguments. See Id.; In re Hedges, 783 F.2d 1038, 1039, 228 USPQ 685, 686 (Fed. Cir. 1986); In re Piasecki, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984); and In re Rinehart, 531 F.2d 1048, 1052, 189 USPQ 143, 147 (CCPA 1976). Only those arguments actually made by appellants have been considered in this decision. Arguments which appellants could have made but chose not to make in the briefs have not been considered and are deemed to be waived. See 37 C.F.R. § 41.37(c)(1)(vii) (2004). See also In re Watts, 354 F.3d 1362, 1368, 69 USPQ2d 1453, 1458 (Fed. Cir. 2004).

I. We consider first the examiner's rejection of claims 1, 4, 5, 8, 11 and 12 as being unpatentable over the teachings of Hori in view of Wolf [answer, page 4]. Since appellants' arguments with respect to this rejection have treated these claims as a single group which stand or fall together, we will select independent claim 1 as the representative claim for this rejection because it is the broadest independent claim. See 37 C.F.R. § 41.37(c)(1)(vii)(2004).

Appellants note that the examiner relies upon the embodiment of Hori that uses silicon dioxide instead of titanium silicide as an implant mask [reply brief, page 4; see also Hori, col. 7, lines 44-46 and figs. 3 and 4].

Appellants further note that the examiner cites page 321 of the Wolf reference as teaching using a photoresist mask in place of a silicon dioxide mask [reply brief, page 4]. Appellants assert that a photoresist mask has less ion stopping power than a silicon dioxide mask of the same thickness [reply brief, page 5; brief, page 6]. Appellants argue that the principle of operation of Hori would change if silicon dioxide was replaced with a photoresist of the same thickness because the weaker ion stopping power of photoresist would be unable to prevent boron ions from permeating near pn-junctions between the  $n^+$ -type source and drain regions and the substrate [reply brief, page 5; brief, page 7, emphasis added].

Appellants further argue that replacing Hori's silicon dioxide mask with the photoresist mask taught by Wolf would require a thicker photoresist mask to achieve the equivalent ion stopping power of silicon dioxide [reply brief, page 6, emphasis added]. Appellants theorize that such a photoresist mask replacement would need to be at least between 0.22 and 0.32  $\mu\text{m}$  (i.e., 220 to 320 nm) in thickness [*id.*]. Appellants assert that the greater thickness required for an equivalent photoresist mask would require a steeper angle at which the boron ions would have to be implanted (e.g., less than 10 degrees or greater than 80 degrees), as opposed to the 20 to 60 degrees (preferably 25 to 45 degrees) taught by Hori at col. 6, lines 56-61



[reply brief, pages 6 and 7; brief, page 8, emphasis added]. Appellants conclude that the use of a steeper angle for ion implantation would change Hori's principle of operation [reply brief, page 7; brief, page 8, emphasis added].

In response, the examiner notes that Hori teaches the use of silicon oxide (i.e., silicon dioxide) as a mask [answer, page 10; see also Hori, fig. 3 and col. 7, lines 45-46]. The examiner notes that Wolf teaches that photoresist is a known material substitute for silicon [di]oxide (Wolf, page 321), and further notes that figs. 36(a) and 36(b) are graphs of ion implantation energy versus thickness for silicon [di]oxide and photoresist, respectively [answer, page 10, ¶12]. The examiner states that Wolf shows that both silicon [di]oxide and photoresist have the ability to stop 99.99% of ionic species for a given thickness [answer, page 10]. The examiner concludes that a comparison between silicon [di]oxide and photoresist has been provided [answer, page 11].

The examiner further notes that Hori teaches that boron ions are implanted at 30 to 50 keV [answer, page 11; see also Hori, col. 6, lines 53-54]. The examiner concedes that at energy levels greater than 30 keV that Wolf teaches a photoresist layer having a thickness that is greater than the thickness of silicon dioxide [answer, page 11; see Wolf, figs. 36(a) and

36(b)]. However, the examiner further notes that Wolf, at an energy of 30 keV, teaches a photoresist thickness of about 0.2  $\mu\text{m}$  (i.e., 200 nm), which is the same thickness disclosed by appellants within the instant specification at page 4, last paragraph [answer, page 11]. The examiner concludes that the function of Hori will not change as a result of the combination since Wolf teaches the use of a thin photoresist which falls within the range disclosed by appellants that results in the formation of the claimed halo regions [*id.*].

At the outset, we note that to reach a proper conclusion under §103, the examiner, as finder of fact, must step backward in time and into the mind of a person of ordinary skill in the art at a time when the invention was unknown, and just before it was made. In light of all the evidence, we review the specific factual determinations of the examiner to ascertain whether the examiner has convincingly established that the claimed invention as a whole would have been obvious at the time of the invention to a person of ordinary skill in the art. In the instant case, the examiner has determined that an artisan having knowledge of both the Hori and Wolf references would have selected a known material (i.e., the photoresist disclosed by Wolf) based on its suitability for its intended use as a mask layer (as discussed by Wolf on page 322) [emphasis added].

We note that the Supreme Court has held that the selection of a known material based on its suitability for its intended use supported a *prima facie* obviousness determination. Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 335, 65 USPQ 297, 301 (1945) (“Reading a list and selecting a known compound to meet known requirements is no more ingenious than selecting the last piece to put into the last opening in a jig-saw puzzle. It is not invention.”). We note that in Sinclair, the patentee had developed a rapidly drying printing ink. *Id.* at 328. All that was needed to produce the ink was a solvent that evaporated quickly upon heating. *Id.* at 331. The choice of solvent in Sinclair was thus dictated by known, required properties [emphasis added]. *Id.* at 335.

Analogous to the facts before the Supreme Court in Sinclair, in the instant case the artisan’s choice of a particular masking material is also dictated by known, required properties, as detailed on page 322 of the Wolf reference [emphasis added]. We agree with the examiner that Wolf suggests to the artisan that photoresist is a known material substitute for silicon dioxide, as Wolf explicitly teaches that photoresist, silicon dioxide (SiO<sub>2</sub>), Si<sub>3</sub>N<sub>4</sub>, polysilicon, metal films, and polyimide are all used for masking purposes [Wolf, page 321, last paragraph]. We note that Wolf suggests a further reason that would motivate an artisan to substitute photoresist for

silicon dioxide. Specifically, Wolf teaches: "SiO<sub>2</sub> [silicon dioxide] and Si<sub>3</sub>N<sub>4</sub> mask layers can be significantly damaged by implanting, with the result that they etch faster than unimplanted layers [page 322, emphasis added].

We find that a close inspection of fig. 36(b) [Wolf, page 322] supports the examiner's contention that Wolf, at an energy level of 30 keV, teaches a photoresist thickness of about 0.2  $\mu\text{m}$ , this being the same thickness (i.e., within the range 0.1 $\mu\text{m}$  to 0.2 $\mu\text{m}$ ) disclosed by appellants within the instant specification [page 4, last paragraph]. We note that fig. 36(b) uses a logarithmic scale to the base 10. We note that the vertical axis of fig. 36(b) denotes the minimum photoresist mask thickness required to stop 99.99% of incident ions as a function of two variables: (1) the energy level (as shown in units of keV on the horizontal axis) and, (2) the particular ionic type (i.e., boron, phosphorous and arsenic ions, as plotted within the graph) [Wolf, page 322, fig. 36(b), emphasis added].

In particular, when we intersect the second horizontal gridline (corresponding to an energy level of 30 keV) with the boron ionic type (B+), as shown within the fig. 36(b) graph, we find that this point corresponds to the first vertical gridline that denotes a photoresist mask with a minimum thickness of 0.2  $\mu\text{m}$  [*id.*, emphasis added]. Thus, we agree with the examiner that Wolf clearly teaches a minimum photoresist thickness of 0.2

$\mu\text{m}$  is required to stop 99.99% of incident boron ions at an energy level of 30 keV [answer, page 11]. We find no evidence in the record to support appellants' assertion that "Wolf clearly indicates that the photoresist thickness is in excess of 2  $\mu\text{m}$  at 30 keV" [reply brief, page 7, ¶2, last sentence, emphasis added]. We further agree with the examiner that the function of Hori will not change when modified by Wolf since Wolf teaches the use of a thin photoresist mask that falls within the range disclosed by appellants that results in the formation of the claimed halo regions [answer, page 11, emphasis added]. Accordingly, we do not find that modifying Hori with Wolf would change Hori's principle of operation nor render Hori unsatisfactory for its intended use, as argued by appellants [brief, page 4].

We further note that appellants' arguments rely on certain assumptions, e.g., appellants assert: "Hence, one can assume that the thicknesses of the titanium silicide films 8a and 8b would roughly correspond to the thicknesses of the  $\text{SiO}_2$  films used in the embodiment using a  $\text{SiO}_2$  film instead of a  $\text{TiSi}_2$  film" [reply brief, page 6, ¶1, emphasis added]. We note that arguments of counsel cannot take the place of evidence in the record [emphasis added]. In re Geisler, 116 F.3d 1465, 1471, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997). To be of probative value, appellants should have timely provided and made of record objective evidence factually

supported by an appropriate affidavit. As a matter of procedure, we note that appellants have failed to provide such evidence supported by an affidavit of record. See MPEP §716.01(c)(II). Accordingly, we will sustain the examiner's rejection of claim 1 for essentially the same reasons argued by the examiner in the answer. Because we have considered claim 1 as the representative claim for this rejection, we will also sustain the examiner's rejection of claims 4, 5, 8, 11, and 12.

II. We next consider the examiner's rejection of claims 7 and 14 as being unpatentable over the teachings of Hori in view of Wolf, and further in view of Thackeray [answer, page 6].

We note that appellants present initial arguments with respect to this rejection on pages 9-14 of the Supplemental Appeal Brief (received Sept. 6, 2005). However, in the reply brief (received Nov. 14, 2005) on page 8 (within the paragraph under subheading C), appellants state the following:

Appellants note to the Board that the arguments presented on pages 9-14 of Appellants' Amended Supplemental Appeal Brief are essentially duplicate of the arguments presented on pages 4-9 of Appellants' Amended Supplemental Appeal Brief and hence may be ignored [emphasis added].

Appellants now assert in the reply brief that dependent claims 7 and 14 are patentable for at least the same reasons that independent claims 1 and 8 are patentable over Hori in view of Wolf [reply brief, page 8].

Accordingly, because we have sustained the examiner's rejection of independent claims 1 and 8, we will also sustain the examiner's rejection of dependent claims 7 and 14 for the same reasons discussed *supra* with respect to representative claim 1.

III. We next consider the examiner's rejection of claim 18 as being unpatentable over the teachings of Liang in view of Wolf [answer, page 6].

(a) Appellants argue that modifying Liang to include a photoresist layer with a thickness between 0.1 $\mu$ m and 0.2 $\mu$ m would change Liang's principle of operation [brief, page 14; reply brief, page 9].

In response, the examiner points out that Liang teaches that boron ions are implanted at about 15 to 50 keV [answer, page 12; see also Liang, col. 3, lines 36-37]. The examiner concedes that Wolf requires a thicker photoresist at an energy level of 50 keV [answer, page 12; see also Wolf, page 322, fig. 36(b)]. However, the examiner notes that Wolf teaches a photoresist mask thickness of about 0.2  $\mu$ m is required to stop 99.99% of

incident ions when boron ions are implanted at an energy level of 30 keV, as discussed *supra* [*id.*]. The examiner further notes that this thickness (0.2  $\mu\text{m}$ ) corresponds to the upper limit of 0.1 to 0.2  $\mu\text{m}$  required by the language of claim 18, and thus the claimed range overlaps or lies inside the ranges disclosed by the prior art [*id.*].

We agree with the examiner that Wolf teaches the use of a thin photoresist that falls within the range claimed by appellants, as discussed *supra* [answer, page 12, emphasis added]. We note that the Court of Appeals for the Federal Circuit has determined: “[w]hen an applicant seeks to overcome a *prima facie* case of obviousness by showing improved performance in a range that is within or overlaps with a range disclosed in the prior art, the applicant must ‘show that the range is *critical*, generally by showing that the claimed range achieves unexpected results relative to the prior art range.’ ” In re Geisler, 116 F.3d 1465, 1469–70, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997), citing In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990). Significantly, we note that appellants have failed to provide a showing demonstrating that the claimed range of the instant photoresist layer is critical and that it achieves unexpected results relative to the prior art range disclosed by Wolf [emphasis added]. Likewise, we find no evidence of record to support appellants’ assertion that



modifying Liang with Wolf would change Liang's principle of operation or render Liang unsatisfactory for its intended use [brief, page 14, reply brief, page 9].

(b) Appellants further argue that neither Liang nor Wolf teach or suggest an oxide trench, a drain region adjacent to the oxide trench, and a source region adjacent to the oxide trench, as required by the language of claim 18 [brief, page 16, reply brief, page 9]. In particular, appellants point to Liang at col. 2, lines 60-63 and assert that Liang teaches elements 14A-14C are separate Shallow Trench Isolation (STI) regions, noting that one would assume these STI regions would have a common label if they were a single oxide trench as argued by the examiner [reply brief, page 10, emphasis added].

The examiner disagrees, responding that Liang's fig. 1C, descriptors 14A and 14B do not refer to two separate oxide trenches, but instead show portions of the same oxide trench, and therefore Liang teaches the drain region and the source region are formed adjacent to the same oxide trench [answer, page 13]. The examiner introduces U.S. Pat. 6,352,903 to Rovedo and the Kang non-patent reference as secondary evidence supporting the

examiner's contention that forming a single oxide trench surrounding the transistor is well known in the art [*id.*].

The ultimate determination of patentability must be based on consideration of the entire record, by a preponderance of evidence, with due consideration to the persuasiveness of any arguments and any secondary evidence. In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). In the instant case, we note that Liang discloses "a set of shallow trench isolation (STI) regions 14A-14C which have been formed in the surface thereof" [Liang, col. 2, lines 61-63, emphasis added]. We further note that Liang's disclosure of "a set" does not preclude the STI regions 14A-14C from being formed as part of the same oxide trench, as argued by the examiner [answer, page 13, emphasis added]. In particular, we note that Liang explicitly discloses a conventional method of fabricating oxide trench structures at col. 2, lines 64-66 [emphasis added]:

In step 41, form conventional STI trench structures 14A, 14B, and 14C in the substrate 12 and then back fill with silicon oxide dielectric in the conventional manner [emphasis added].

We find the examiner's contention that a single oxide trench is known in the art is supported by Liang's disclosure of "conventional STI trench structures" fabricated in a "conventional manner" [Liang, col. 2, lines 64-66, answer, page 13, ¶2, emphasis added]. We further note that the Kang

reference provided by the examiner (as secondary evidence of conventional teachings known in the art) shows the SiO<sub>2</sub> (silicon dioxide) region as a single trench structure surrounding the transistor area [Kang, fig. 2.6, page 31, emphasis added]. Accordingly, after consideration of the entire record, we find that the preponderance of evidence does support the examiner's position.

(c) Appellants further argue that Liang fails to teach a photoresist over the oxide trench and over a substantial portion of the source and drain regions, as recited in claim 18 [brief, pages 16 and 17, reply brief, pages 10 and 11, emphasis added].

In response, the examiner cites Playtext Products, Inc. v. Procter & Gamble Co., 400 F.3d 901, 907, 73 USPQ2d 2010, 2015 (Fed. Cir. 2005) ("The term 'substantial' is a meaningful modifier implying 'approximate,' rather than 'perfect.' "), citing Liquid Dynamics Corp. v. Vaughan Co., Inc., 355 F.3d 1361, 1368, 69 USPQ2d 1595, 1600 (Fed. Cir. 2004) [answer, page 14]. In construing the instant claimed "substantial portion" in light of Playtext Products, *supra*, the examiner concludes that the term "substantial" is merely a term of degree and should not be interpreted as having a strict numerical limitation [*id.*]. The examiner maintains that the regions covered

by photoresist (shown as "PR2" in fig. 1C of Liang) can be reasonably considered to be "substantial" [*id.*].

We note that our reviewing court has adopted a broad construction for the term "substantial" as used in patent claims. The Court of Appeals for the Federal Circuit has recently reaffirmed that the term "substantial" implies "approximate." Wilson Sporting Goods Co. v. Hillerich & Bradsby Co., 442 F.3d 1322, 1329, 78 USPQ2d 1382, 1387 (Fed. Cir. 2006). In Wilson Sporting Goods, the court determined that a claimed "insert having a substantially circular cross-section" did not need to be perfectly circular [emphasis added]. Wilson Sporting Goods, 442 F.3d at 1328-29, 78 USPQ2d at 1387. Similarly, in Playtext Products, the court determined that the claimed "substantially flattened surfaces" did not require a perfectly flat surface [emphasis added]. Playtext Products, 400 F.3d at 907, 73 USPQ2d at 2015.

Given the broad construction accorded the term "substantial" by the Court of Appeals for the Federal Circuit, we agree with the examiner that the regions covered by photoresist (shown as "PR2" in fig. 1C of Liang) can be reasonably considered to be "substantial." Accordingly, we will sustain the examiner's rejection of independent claim 18 for essentially the same reasons argued by the examiner in the answer.

IV. We next consider the examiner's rejection of claim 19 as being unpatentable over the teachings of Liang in view of Wolf, and further in view of Thompson [answer, page 8].

Appellants argue that Liang, Wolf, and Thompson, singly or in combination do not teach nor suggest that the halo implant is implanted at a substantially 45-degree angle, as claimed [brief, page 17; claim 19]. Appellants further argue that combining Liang with Thompson would change Liang's principle of operation [brief, page 18]. Finally, appellants argue that the examiner's proffered motivation does not address why one of ordinary skill in the art would modify Liang to implant a halo implant at a substantially 45-degree angle, as claimed [brief, page 21; claim 19].

The examiner responds that the Thompson reference was cited merely to show that it is known in the art to implant impurities at a 45-degree angle [answer, page 14]. The examiner further notes that this teaching is also disclosed by Hori at col. 6, lines 60-62 [*id.*]. The examiner asserts that appellants' argument pointing out that Thompson formed region 25 (fig. 2) instead of a conventional halo region is irrelevant since the sole purpose of citing Thompson is to demonstrate that the claimed implantation angle of 45 degrees is known in the art [*id.*].

We note that the reason or motivation to modify the reference may often suggest what the inventor has done, but for a different purpose or to solve a different problem. It is not necessary that the prior art suggest the combination to achieve the same advantage or result discovered by applicant. In re Dillon, 919 F.2d 688, 693, 16 USPQ2d 1897, 1901 (Fed. Cir. 1990), cert. denied, 500 U.S. 904 (1991), ("In particular, the statement that a *prima facie* obviousness rejection is not supported if no reference shows or suggests the newly-discovered properties and results of a claimed structure is not the law."). In the instant case, we note that the motivation relied upon by the examiner (i.e., improving punchthrough characteristics) is taken directly from the Thompson reference (col. 1, lines 40-41) [answer, page 8]. We further note that Liang, Wolf and Thompson are clearly analogous references taken from the same field of endeavor (i.e., semiconductor fabrication). Given the examiner's proffered reason for relying upon Thompson, *supra*, we find no evidence of record to support appellants' assertion that combining Liang and Thompson would change Liang's principle of operation. Accordingly, we will sustain the examiner's rejection of dependent claim 19 for essentially the same reasons argued by the examiner.

V. Lastly, we consider the examiner's rejection of claim 20 as being unpatentable over the teachings of Liang in view of Wolf, and further in view of Thackeray [answer, page 8].

Appellants argue that the examiner has not provided a sufficient motivation why an artisan, confronted with the same problems as the inventor, and with no knowledge of the claimed invention, would modify Liang to include a photoresist layer that comprises a deep ultraviolet layer [brief, pages 22-24, reply brief, pages 12 and 13].

In response, the examiner cites In re Beattie, 974 F.2d 1309, 24 USPQ2d 1040 (Fed. Cir. 1992), where the Court of Appeals for the Federal Circuit reaffirmed that "[a]s long as some motivation or suggestion to combine the references is provided by the prior art taken as a whole, the law does not require that the references be combined for the reasons contemplated by the inventor." In re Beattie, 974 F.2d at 1312, 24 USPQ2d at 1042 [answer, page 15]. The examiner further notes that Thackeray teaches the proffered motivation at col. 12, lines 60-65 and col. 13, lines 1-6 (i.e., "to effectively activate the photoactive component of the photoresist system ... to produce a patterned image" [answer, pages 9 and 15]).

The Court of Appeals for the Federal Circuit has determined that the motivation to combine under §103 must come from a teaching or suggestion

within the prior art, within the nature of the problem to be solved, or within the general knowledge of a person of ordinary skill in the field of the invention, to look to particular sources, to select particular elements, and to combine them as combined by the inventor [emphasis added]. Ruiz v. A.B. Chance Co., 234 F.3d 654, 665, 57 USPQ2d 1161, 1167 (Fed. Cir. 2000). In the instant case, we note that the motivation proffered by the examiner is taken directly from the Thackeray reference at col. 12, lines 60-65, and col. 13, lines 1-6 [answer, pages 9 and 15]. We also note that the Thackeray reference is specifically directed to applying Deep Ultraviolet Radiation (DUV) to a photoresist composition, e.g., see Thackeray at col. 1, lines 5 and 6: "This invention relates to photoresist compositions particularly suitable for DUV exposure" [see also Thackeray at col. 13, lines 1-6, emphasis added]. Thackeray also teaches the general use of photoresists in the context of semiconductor fabrication at col. 12, lines 47-52:

The resist compositions of the invention are applied to substrates conventionally used in processes involving coating with photoresists. For example, the composition may be applied over silicon or silicon dioxide wafers for the production of microprocessors and other integrated circuit components.

We note that the Wolf reference also discloses the use of a photoresist mask in IC fabrication, as discussed *supra* [Wolf, pages 321 and 322].



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When we consider the prior art taken as a whole, we find that the examiner has applied a combination of references (i.e., Liang, Wolf, and Thackeray) that clearly meets the language of the claim (i.e., "said photoresist layer comprises a deep ultraviolet layer") [claim 20]. We further find that the examiner has provided a proper teaching or suggestion found within the prior art that would reasonably motivate one of ordinary skill in the art to combine the references in the manner suggested by the examiner.

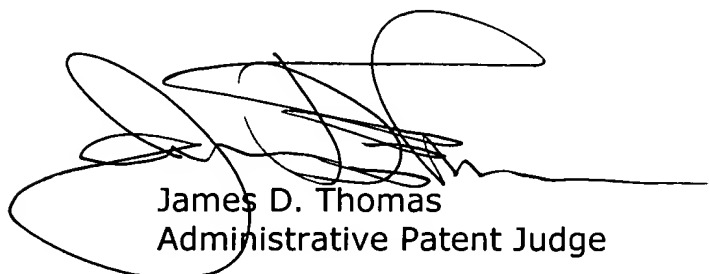
Accordingly, we will sustain the examiner's rejection of dependent claim 20 for essentially the same reasons argued by the examiner.

In summary, we have sustained the examiner's rejections of all claims on appeal. Therefore, the decision of the examiner rejecting claims 1, 4, 5, 7, 8, 11, 12, 14 and 18-20 is affirmed.

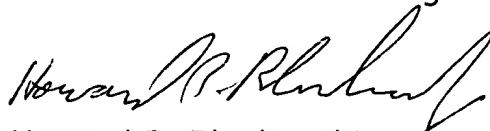
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No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED.

  
James D. Thomas  
Administrative Patent Judge

  
Jerry Smith  
Administrative Patent Judge

  
Howard B. Blankenship  
Administrative Patent Judge

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) INTERFERENCES  
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Application No. 09/497,320

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